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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/695,415	10/29/2003	Hidenori Kawanishi	204552030500	5623

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EXAMINER	
VAN ROY, TOD THOMAS	
ART UNIT	**PAPER NUMBER**
2828	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/695,415	Applicant(s) KAWANISHI ET AL.	
	Examiner Tod T. Van Roy	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 08 December 2005.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-26 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-26 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The examiner acknowledges the amending of claims 1-2, 11-12, 21-22, and 24-25.

Response to Arguments

Applicant's arguments filed 12/08/2005 have been fully considered but they are not persuasive.

With respect to claims 2-5, 12-15, 22-23, and 25-26, the applicant argues that there is not motivation for use of the doping of Nomura with the active region of Fukunaga. The examiner disagrees with this point, as the motivation for doping the active layer of Fukunaga is not needed, since this is taught in the primary reference of Nomura. Motivation for the use of the active region material of Fukunaga is necessary and is provided in the rejection to the claims.

Updated rejections to the claims as per the new amendments follow.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-5, 10-15, and 20-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (JP-2000-340894, submitted by applicant) in view of Fukunaga et al. (EP 0 920 096 A2, submitted by applicant).

With respect to claims 1-2, Nomura teaches a semiconductor laser device comprising: a substrate (fig.1 #1)); a first conductivity-type (denoted as n) lower clad layer deposited (fig.1 #4) on the first conductivity-type semiconductor first conductivity-type semiconductor substrate; a quantum well active layer deposited on the first conductivity-type lower clad layer (fig.1 #7); and a second conductivity-type (denoted as p) upper clad layer (fig.1 #10) deposited on the quantum well active layer, wherein the quantum well active layer comprises at least two barrier layers and at least one well layer, and the barrier layers and the well layers are alternately stacked (fig.1, [00332]), wherein the quantum well active layer is doped with second conductivity type impurity (Zn) ([0066], Zn). Nomura does not teach the top and bottom layers of the active region to be barrier layers, or the active layer to be of a non-Al based material (InGaAsP) and emit light between 760-800nm. Fukunaga teaches a semiconductor laser device using InGaAsP well and barrier layers (abs.) and emits within the specified range ([0104]), as

well as the use of an active region that has barrier layers at the top and bottom (fig.1 #4, 6). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser device of Nomura with the top and bottom barrier layers of Fukunaga in order to induce lattice relaxation in the active region which would lead to reduced light absorption at a light radiating end, as well as reduce the amount of electron and hole leakage from the active layer (due to the height and presence of the surrounding barriers) which would lower the amount of heat generated (Fukunaga, [0021]); as well as to utilize the active layer material of Fukunaga in order to achieve emission on the order of 780nm, which is well known in the art to be used in recording mediums such as optical discs. In addition, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the laser of these known materials, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

A reference noted, but not relied upon for this rejection is Shiomoto et al. (US 6456635) that speaks of this wavelength regime being useful for optical discs (col.1 lines 20-54).

With respect to claim 3, Nomura and Fukunaga teach the laser device as outlined in the rejection to claim 2, and Nomura further teaches the Zn doping (and all impurity dopants) to be 2x10^17 cm-3 or less ([0011]).

With respect to claim 4, Nomura and Fukunaga teach the laser device as outlined in the rejection to claim 2, and Nomura further teaches a guide layer made of AlGaAs-based material and interposed between the quantum well active layer and the upper clad layer (fig.1 #8) and between the quantum well active layer and the lower clad layer (fig.1 #6).

With respect to claim 5, Nomura and Fukunaga teach the laser device as outlined in the rejection to claim 4, and Nomura further teaches the mixed crystal ratio of the Al in the guide layers is larger than .2 (table 1, each amount is .35).

With respect to claim 10, Nomura and Fukunaga the laser device outlined in claim 1, and further teach the use of the laser device as the source in an optical disk unit (Nomura, [0002]).

With respect to claims 11-12, Nomura teaches a semiconductor laser device comprising: a substrate (fig.1 #1)); a first conductivity-type (denoted as n) lower clad layer deposited (fig.1 #4) on the first conductivity-type semiconductor first conductivity-type semiconductor substrate; a quantum well active layer deposited on the first conductivity-type lower clad layer (fig.1 #7); and a second conductivity-type (denoted as p) upper clad layer (fig.1 #10) deposited on the quantum well active layer, wherein the quantum well active layer comprises at least two barrier layers and at least one well layer, and the barrier layers and the well layers are alternately stacked (fig.1, [00332]), wherein the quantum well active layer is doped with second conductivity type impurity (Si) ([0032], Si). Nomura does not teach the top and bottom layers of the active region to be barrier layers, or the active layer to be of a non-Al based material (InGaAsP) and

emit light between 760-800nm. Fukunaga teaches a semiconductor laser device using InGaAsP well and barrier layers (abs.) and emits within the specified range ([0104]), as well as the use of an active region that has barrier layers at the top and bottom (fig.1 #4, 6). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser device of Nomura with the top and bottom barrier layers of Fukunaga in order to induce lattice relaxation in the active region which would lead to reduced light absorption at a light radiating end, as well as reduce the amount of electron and hole leakage from the active layer (due to the height and presence of the surrounding barriers) which would lower the amount of heat generated (Fukunaga, [0021]); as well as to utilize the active layer material of Fukunaga in order to achieve emission on the order of 780nm, which is well known in the art to be used in recording mediums such as optical discs. In addition, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the laser of these known materials, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

A reference noted, but not relied upon for this rejection is Shiomoto et al. (US 6456635) that speaks of this wavelength regime being useful for optical discs (col.1 lines 20-54).

With respect to claim 13, Nomura and Fukunaga teach the laser device as outlined in the rejection to claim 12, and Nomura further teaches the Zn doping (and all impurity dopants) to be 2x10^17 cm-3 or less ([0011]).

With respect to claim 14, Nomura and Fukunaga teach the laser device as outlined in the rejection to claim 12, and Nomura further teaches a guide layer made of AlGaAs-based material and interposed between the quantum well active layer and the upper clad layer (fig.1 #8) and between the quantum well active layer and the lower clad layer (fig.1 #6).

With respect to claim 15, Nomura and Fukunaga teach the laser device as outlined in the rejection to claim 14, and Nomura further teaches the mixed crystal ratio of the Al in the guide layers is larger than .2 (table 1, each amount is .35).

With respect to claim 20, Nomura and Fukunaga the laser device outlined in claim 1, and further teach the use of the laser device as the source in an optical disk unit (Fukunaga, [0002]).

With respect to claims 21-22, Nomura teaches a manufacturing method of a semiconductor laser device, comprising: depositing first conductivity-type lower clad layer on a first conductivity-type semiconductor substrate (n-type [0040]); depositing a quantum well active layer ([0032]); and depositing a second conductivity-type upper clad layer on the quantum well active layer (p-type [0040]), wherein the quantum well active layer comprises at least two barrier layers and at least one well layer, and the barrier layers and well layer are alternatively stacked ([0032], fig.1),wherein the quantum well active layer grown while being doped with a second conductivity type of

impurity (Zn) (Zn [0066], [0043-44]). Nomura does not teach the top and bottom layers of the active region to be barrier layers, or the active layer to be of a non-Al based material (InGaAsP) and emit light between 760-800nm. Fukunaga teaches a semiconductor laser device using InGaAsP well and barrier layers (abs.) and emits within the specified range ([0104]), as well as the use of an active region that has barrier layers at the top and bottom (fig.1 #4, 6). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser device of Nomura with the top and bottom barrier layers of Fukunaga in order to induce lattice relaxation in the active region which would lead to reduced light absorption at a light radiating end, as well as reduce the amount of electron and hole leakage from the active layer (due to the height and presence of the surrounding barriers) which would lower the amount of heat generated (Fukunaga, [0021]); as well as to utilize the active layer material of Fukunaga in order to achieve emission on the order of 780nm, which is well known in the art to be used in recording mediums such as optical discs. In addition, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the laser of these known materials, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

A reference noted, but not relied upon for this rejection is Shiomoto et al. (US 6456635) that speaks of this wavelength regime being useful for optical discs (col.1 lines 20-54).

With respect to claim 23, Nomura and Fukunaga teach the laser device as outlined in the rejection to claim 22, and Nomura further teaches the Zn doping (and all impurity dopants) to be 2x10^17 cm-3 or less ([0011]).

With respect to claims 24-25, Nomura teaches a manufacturing method of a semiconductor laser device, comprising: depositing first conductivity-type lower clad layer on a first conductivity-type semiconductor substrate (n-type [0040]); depositing a quantum well active layer ([0032]); and depositing a second conductivity-type upper clad layer on the quantum well active layer (p-type [0040]), wherein the quantum well active layer comprises at least two barrier layers and at least one well layer, and the barrier layers and well layer are alternatively stacked ([0032], fig.1),wherein the quantum well active layer grown while being doped with a second conductivity type of impurity (Si) (Si [0032], [0043]). Nomura does not teach the top and bottom layers of the active region to be barrier layers, or the active layer to be of a non-Al based material (InGaAsP) and emit light between 760-800nm. Fukunaga teaches a semiconductor laser device using InGaAsP well and barrier layers (abs.) and emits within the specified range ([0104]), as well as the use of an active region that has barrier layers at the top and bottom (fig.1 #4, 6). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser device of Nomura with the top and bottom barrier layers of Fukunaga in order to induce lattice relaxation in the active region which would lead to reduced light absorption at a light radiating end, as well as reduce the amount of electron and hole leakage from the active layer (due to the height and presence of the surrounding barriers) which would lower the amount of heat generated

(Fukunaga, [0021]); as well as to utilize the active layer material of Fukunaga in order to achieve emission on the order of 780nm, which is well known in the art to be used in recording mediums such as optical discs. In addition, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the laser of these known materials, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

A reference noted, but not relied upon for this rejection is Shiomoto et al. (US 6456635) that speaks of this wavelength regime being useful for optical discs (col.1 lines 20-54).

With respect to claim 26, Nomura and Fukunaga teach the laser device as outlined in the rejection to claim 22, and Nomura further teaches the Si doping (and all impurity dopants) to be 2x10^17 cm-3 or less ([0011]).

Claims 6-9 and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura in view of Fukunaga and further in view of Fukunaga (US 2002/0044584).

With respect to claims 6-9, Nomura and Fukunaga teach the device outlined in the rejection to claim 2 above, but do not teach the well layer to have compressive strain at or below 3.5%, or the barrier layers to have tensile strain at or below 3.5%. Fukunaga '584 teaches an InGaAsP active region wherein the quantum well is compressively strained below 3.5% ([0013] product of strain and thickness taught to be

.25nm or *smaller*), while the barrier layers are tensile strained below 3.5% ([0015] product of strain and thickness taught to be .25nm or *smaller*). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser device of Nomura and Fukunaga with the strained layers of Fukunaga '584 in order to improve threshold current and reliability (Fukunaga '584, [0033]).

With respect to claims 16-19, Nomura and Fukunaga teach the device outlined in the rejection to claim 12 above, but do not teach the well layer to have compressive strain at or below 3.5%, or the barrier layers to have tensile strain at or below 3.5%. Fukunaga '584 teaches an InGaAsP active region wherein the quantum well is compressively strained below 3.5% ([0013] product of strain and thickness taught to be .25nm or *smaller*), while the barrier layers are tensile strained below 3.5% ([0015] product of strain and thickness taught to be .25nm or *smaller*). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser device of Nomura and Fukunaga with the strained layers of Fukunaga '584 in order to improve threshold current and reliability (Fukunaga '584, [0033]).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVR

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PRIMARY EXAMINER